

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims

Claim 1 (previously presented): A substrate coated with a silica-containing film with a low-dielectric constant, which is a low-density film formed by:

(a) applying onto a substrate the coating liquid for forming a silica-containing film with a low-dielectric constant comprising a polymer composition consisting essentially of (i) a polysiloxane and (ii) a readily decomposable resin,

said polysiloxane being a reaction product between fine particles of silica and a hydrolyzate of at least one alkoxysilane represented by the following formula (I):



wherein X represents a hydrogen atom, a fluorine atom, an unfluorinated or fluorinated alkyl group of 1 to 8 carbon atoms, an aryl group or a vinyl group; R represents a hydrogen atom, an alkyl group of 1 to 8 carbon atoms, an aryl group or a vinyl group; and n is an integer of 0 to 3;

(b) heating the thus-coated film; and then

(c) decomposing or vaporizing the readily decomposable resin contained in the film by a heat treatment at a temperature of not higher than 500°C or by irradiation with ultraviolet radiation, infrared radiation, electron beam, X-ray or oxygen plasma, wherein the average diameter of pores or voids present in the low density silica film is not more than 10 nm.

Claim 2 (original): The substrate coated with a silica-containing film with a low-dielectric constant as claimed in claim 1, wherein the average diameter of pores or voids present in the low-density silica film is not more than 5 nm.

Claim 3 (currently amended): ~~A~~The substrate coated with a silica-containing film with a low-dielectric constant, ~~which is a low density film formed by:~~

- ~~_____ (a) _____ applying onto a substrate the coating liquid for forming a silica-containing film with a low dielectric constant according to~~ as claimed in claim 1, wherein the polymer composition is an interpenetrated polymer composition in which the polysiloxane and the readily decomposable resin are entangled in each other on the molecular chain level;
~~_____ (b) _____ heating the thus coated film; and~~
~~_____ (c) _____ decomposing or vaporizing the readily decomposable resin contained in the film by a heat treatment at a temperature of not higher than 500°C or by irradiation with ultraviolet radiation, infrared radiation, electron beam, X-ray or oxygen plasma, wherein the average diameter of pores or voids present in the low density silica film is not more than 10nm.~~

Claim 4 (currently amended): ~~A~~The substrate coated with a silica-containing film with a low-dielectric constant, ~~which is a low density film formed by:~~

- ~~_____ (a) _____ applying onto a substrate the coating liquid for forming a silica-containing film with a low dielectric constant according to~~ as claimed in claim 1, wherein the fine particles of silica are obtained by hydrolyzing at least one alkoxysilane represented by the formula (I), optionally followed by aging;
~~_____ (b) _____ heating the thus coated film; and~~
~~_____ (c) _____ decomposing or vaporizing the readily decomposable resin contained in the film by a heat treatment at a temperature of not higher than 500°C or by irradiation with ultraviolet radiation, infrared radiation, electron beam, X-ray or oxygen plasma.~~

Claim 5 (currently amended): ~~A~~The substrate coated with a silica-containing film with a low-dielectric constant, ~~which is a low density film formed by:~~

- ~~_____ (a) _____ applying onto a substrate the coating liquid for forming a silica-containing film with a low dielectric constant according to~~ as claimed in claim 1, wherein the polysiloxane is obtained by allowing a hydrolyzate of at least one alkoxysilane represented by the formula (I) to react with the surfaces of the fine particles of silica;

~~_____ (b) heating the thus-coated film; and~~
~~_____ (c) decomposing or vaporizing the readily decomposable resin contained~~
~~in the film by a heat treatment at a temperature of not higher than 500°C or by irradiation~~
~~with ultraviolet radiation, infrared radiation, electron beam, X-ray or oxygen plasma.~~

Claim 6 (currently amended): ~~A~~The substrate coated with a silica-containing film with a low-dielectric constant, ~~which is a low density film formed by:~~

~~_____ (a) applying onto a substrate the coating liquid for forming a silica-~~
~~containing film with a low dielectric constant according to as claimed in claim 1, wherein the~~
readily decomposable resin is a resin which is decomposed or vaporized by heating at a
temperature of not more than 500°C or by irradiating with ultraviolet radiation, infrared
radiation, electron beam, X-ray or oxygen plasma;

~~_____ (b) heating the thus-coated film; and~~
~~_____ (c) decomposing or vaporizing the readily decomposable resin contained~~
~~in the film by a heat treatment at a temperature of not higher than 500°C or by irradiation~~
~~with ultraviolet radiation, infrared radiation, electron beam, X-ray or oxygen plasma.~~

Claim 7 (currently amended): ~~A~~The substrate coated with a silica-containing film with a low-dielectric constant, ~~which is a low density film formed by:~~

~~_____ (a) applying onto a substrate the coating liquid for forming a silica-~~
~~containing film with a low dielectric constant according to as claimed in claim 1, wherein the~~
readily decomposable resin has a number-average molecular weight of 500 to 50,000 based
on polystyrene;

~~_____ (b) heating the thus-coated film; and~~
~~_____ (c) decomposing or vaporizing the readily decomposable resin contained~~
~~in the film by a heat treatment at a temperature of not higher than 500°C or by irradiation~~
~~with ultraviolet radiation, infrared radiation, electron beam, X-ray or oxygen plasma.~~

Claim 8 (currently amended): ~~A~~The substrate coated with a silica-containing film with a low-dielectric constant, ~~which is a low density film formed by:~~

~~_____ (a) _____ applying the coating liquid for forming a silica-containing film with a low-dielectric constant according to as claimed in claim 1, wherein the polymer composition is obtained by performing a catalytic hydrolysis reaction of alkoxysilane in a solution comprising:~~

(i) the fine particles of silica having an average particle diameter of 5 to 50 nm;

(ii) at least one alkoxysilane represented by the above formula (I);
and

(iii) the readily decomposable resin dissolved in an organic solvent being insoluble in water,

with addition thereto of water and an acid catalyst or an aqueous solution containing the acid catalyst;

~~_____ (b) _____ heating the thus-coated film; and~~

~~_____ (c) _____ decomposing or vaporizing the readily decomposable resin contained in the film by a heat treatment at a temperature of not higher than 500°C or by irradiation with ultraviolet radiation, infrared radiation, electron beam, X-ray or oxygen plasma.~~

Claim 9 (currently amended): ~~A~~The substrate coated with a silica-containing film with a low-dielectric constant, ~~which is a low-density film formed by:~~

~~_____ (a) _____ applying onto a substrate the coating liquid for forming a silica-containing film with a low-dielectric constant according to as claimed in claim 1, wherein a weight ratio (A/B) of the polysiloxane (A), in terms of SiO₂, to the readily decomposable resin (B), both being a constituent part of the polymer composition, is in the range of 95/5 to 50/50;~~

~~_____ (b) _____ heating the thus-coated film; and~~

~~_____ (c) _____ decomposing or vaporizing the readily decomposable resin contained in the film by a heat treatment at a temperature of not higher than 500°C or by irradiation with ultraviolet radiation, infrared radiation, electron beam, X-ray or oxygen plasma.~~

Response Under 37 CFR 1.116

Expedited Procedure

Examining Group 1712

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Claim 10 (currently amended): ~~A~~The substrate coated with a silica-containing film with a low-dielectric constant, ~~which is a low density film formed by:~~

~~_____ (a) _____ applying onto a substrate the coating liquid for forming a silica-containing film with a low dielectric constant according to as claimed in claim 1, wherein a mixing ratio (A/B) by weight, in terms of SiO₂, of the fine particles of silica (A) to the alkoxysilane (B) represented by the formula (I), both being used for preparing the polysiloxane, is in the range of 1/99 to 10/90;~~

~~_____ (b) _____ heating the thus coated film; and~~

~~_____ (c) _____ decomposing or vaporizing the readily decomposable resin contained in the film by a heat treatment at a temperature of not higher than 500°C or by irradiation with ultraviolet radiation, infrared radiation, electron beam, X-ray or oxygen plasma.~~

Claims 11-18 (cancelled).